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## BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

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Berkeley, California

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Project

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## TITLE

MEMORANDUM ON WEEVIL INFESTATION IN PONDEROSA PINE REPRODUCTION ON THE SIERRA NATIONAL FOREST, CALIFORNIA

(Cylindrocopturus eatoni Buchenan)

SUBJECT—

INDEX No.—

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To: F. C. Craighead, In Charge, Forest Insect Investigations

From: J. M. Miller, In Charge, Berkeley Laboratory

Subject: Cylindrocopturus Damage to Reproduction on Burns

One of the developments in the survey program of this season was the discovery of a severe weevil infestation in ponderosa pine reproduction on a burn in the Sierra. Time was not available for anything more than an appraisal of conditions based on general observations. However, it seems desirable to present the problem in the light of its implications, which Eaton has done in the enclosed memorandum. The conditions on this area present an opportunity for a study that should be very much worth while. Not only the weevil, but other insects may play an important role in the restocking of burned areas which has been overlooked, mainly because we have given little attention to problems in this field.

JMM

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MEMORANDUM ON WEEVIL INFESTATION IN PONDEROSA PINE REPRODUCTION ON THE SIERRA NATIONAL FOREST, CALIFORNIA

An infestation of the pine reproduction weevil, Cylindrocopturus eatoni Buchanan, has been discovered in ponderosa pine on the Horse Meadow burn, Sierra National Forest. The infestation was first noted when the area was examined on November 4 by Ranger Munhall of the Miami Ranger District and Associate Entomologist J. E. Patterson of the Forest Insect Laboratory at Berkeley. Patterson attributed the damage to the weevil, and verification of this determination was later made by Messrs. H. C. Hall and C. B. Eaton, also from the Berkeley laboratory. It is estimated that between 25 and 40 percent of the reproduction on the area has been killed by the weevil.

Looking back into the recent history of the area as far as it can be pieced together from scattered correspondence and bits of information gleaned from those who are familiar with the burn, it is interesting to recall some of the ecological developments leading up to the present situation. The fire occurred in the summer of 1934 in a basin of pine timber just to the south of Crow Hill, and several miles southwest of the Signal Peak Lookout. Starting near the ranch from which it derives its name, the fire burned through the pine in the bottom of the basin and ran on up through the pine and oak to the top of the ridge southeast of Crow Hill. According to Forest Service records 4300 acres of land were devastated in this one burn. A large portion of the timber was destroyed, except for a few scattered trees within the burn in which the fire did not crown. The heat of the blaze consumed the ground cover of brush and bear clover, exposing mineral soil. With the seedbed thus prepared, a good crop of seed from the surviving trees, added to the dormant viable seed remaining in the soil, germinated under favorable weather conditions, forming a dense cover of ponderosa pine seedlings over the entire area by 1936.

Such records as the Forest Insect Laboratory has on insect activity in this area concern species attacking mature trees. According to observations recorded in 1936 by J. M. Miller, in correspondence with the Forest Supervisor of the Sierra National Forest, very little insect activity followed the fire in the seasons of 1934 and 1935, except for the workings of flatheads in badly firescarred trees. In the summer of the following year, however, a severe outbreak of western pine beetle occurred in trees adjacent to the most severely burned areas. The trees killed in the attack were nearly all trees having but slight foliage injury from the fire, and little or no basal injury save for the scorching of the bark around the base. The outbreak resulted in the removal of many of the surviving trees which would have served as cover for the reproduction that had started. Weevil damage to the reproduction was not observed in this area at the time, either in the burn or in the surrounding unburned stand. It is consequently impossible to say just how or when the insect got into the area. Certainly no such widespread damage as was found this fall could have been present for it could not have passed unnoticed. As far as it is known the infestation discovered this year is the first in which widespread mortality to a stand of pine reproduction has been noted.

Attention of:
Evenden
Nagel
Gibson
Rust
Terrell
English

In appearance the weeviled reproduction resembles the damage that light ground fires cause to similar stands. Many trees are dead, with brown needles, while others are sickly and yellow. The mortality is not confined to individual trees that are scattered throughout the dense brush (Ceanothus spp.) that forms a major part of the cover, but it occurs in the patches of pure pine reproduction spotted over the area, as well as in the scattered pine seedlings growing in the open over bear clover. By far the greater part of the damage has occurred within the last two years. However, there are remnants of trees that have been infested prior to this, and it is likely that the infestation has been going on under endemic conditions for some time in the past. It is probable that unless some unforeseen environmental check develops to control this insect, more drastic losses in the pine reproduction will occur within the next year or two, in the Harris Ranch burn at least, than have occurred in all the previous years combined. There is at present (potentially at least, since the insect is now in the larval stage) a tremendous population. If this population develops normally and the adults emerge next spring according to their usual habit, it is not likely that a very large portion of the present living reproduction will survive.

It should be recalled in passing that the pine reproduction weevil responsible for the damage reported in the foregoing paragraphs is the same insect that caused trouble in the brushfield plantings at Big Springs on the Lassen National Forest in recent years. Until the damage in this plantation was noted, it was not known that this particular species existed or that it was injurious. A season's study revealed that it occurred rather commonly in natural reproduction in the Hat Creek area and on the Lassen plateau, but that under normal conditions it did not build up to epidemic proportions. It was also found that the insect usually has a one year life cycle, and that under natural conditions it is probably kept in check by a combination of factors, the two most important of which are a scarcity of suitable host material in the all aged forest, and the prevalence of natural parasites. Tests showed that the weevils could not be controlled by population reduction measures, but that concentrated lead arsenate sprays, applied at the time the adults were active in the spring, would successfully prevent attack.

The presence of the weevil in the Sierra region raises again the question of the importance of insects in the restocking of cutover and burned lands throughout the pine country. It is a matter of common observation that restocking on such lands is rarely satisfactory, yet sufficient information is not yet available to evaluate the effect of entomological factors. Cone and seed insects are known to be responsible in certain instances for seed mortality ranging between 40 and 60 percent. Cutworms may destroy as high as 50 percent of the seedlings germinated from seed that has escaped these enemies. In spite of these hazards a

good cover crop of pine may become well established on an area, only to meet with disaster when invaded by the reproduction weevil. When the trees are killed, competing weed species (brush, bear clover, etc.) may be so well established that they are able to take over the site and prevent the reseeding of pine. Further information is needed on the quantitative effect of such insects as the pine reproduction weevil on the natural succession of age classes between the seedling and the pole stage.

Respectfully submitted,

Charles B. Eaton
Assistant Entomologist

Berkeley, California
November 25, 1941